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*Storage*Works

RA7000 / ESA10000
High Availability Solution Kit
for HP-UX

Installation Guide

EK–HAHPU–MH. B01

Digital Equipment Corporation
Maynard, Massachusetts

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Revision Record

This Revision Record provides a concise publication history of this manual. It lists the manual revision levels, release dates, and reasons for the revisions.

The following revision history lists all revisions of this publication and their effective dates. The publication part number is included in the Revision Level column, with the last entry denoting the latest revision.

This publication supports the StorageWorks RA7000 / ESA10000 Subsystem configured with or without a SCSI hub interconnect to two Hewlett Packard host servers running the HP-UX (Version 10.20 or later) operating system. The SCSI host adapters supported are HP models A28696A, A2969A and A4107A (all High Density 68-Pin compatible). Hewlett Packard MC/ServiceGuard (Version 10.10 or later) is the cluster software supported by this publication.

Revision Level	Date	Summary of Changes
EK–HAHPU–MH. A01	July 1998	Original release.
EK–HAHPU–MH. B01	September 1998	Second release.

About This Guide

This section provides an overview of a StorageWorks RAID high availability (HA) cluster storage environment and defines the scope and conventions of this guide. It identifies associated reference documentation, and the StorageWorks sales, service, and technical support contacts worldwide.

An Overview of the RAID High Availability Cluster Solution for HP-UX

The RA7000 / ESA10000 Cluster solution for HP-UX enables two (or more) Hewlett Packard host servers to share a RAID storage subsystem through a SCSI bus, with MC/ServiceGuard cluster software. Should a failure on a host server occur, the failure is detected and the I/O is re-routed through to a functioning host server. This process, called failover, requires no resource downtime - ensuring the high availability of data. The failed component(s) can be warm-swapped or serviced while functioning components remain active.

Figure 1 RAID High Availability Cluster Concept
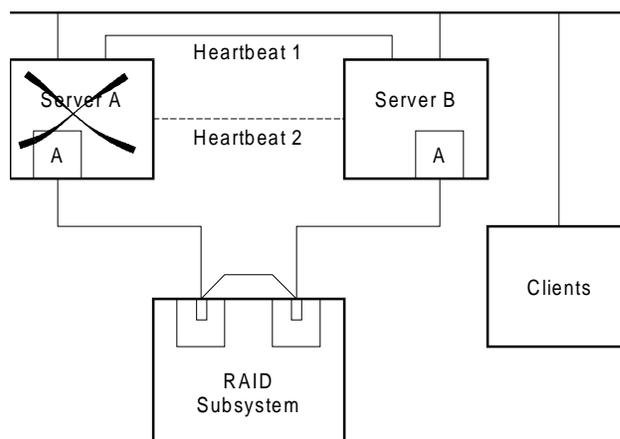
Figure 1 shows a basic cluster layout, where two host servers share a RAID subsystem via a single SCSI bus. It is possible to expand a cluster to include additional host servers on a single SCSI bus, or a second RAID subsystem on a separate SCSI bus. Illustrations of expanded clusters are provided in Appendix A of this guide.

Defining a "Clustered Host Server"

For the host servers to be considered part of "the cluster" (e.g., share the RAID subsystem(s) and possess I/O failover capabilities), each server must be configured with MC/ServiceGuard cluster software, (including a "package" to failover the RAID CC agent), and the SCSI pass through device drivers that enable the SWCC agent to communicate with the RAID subsystem(s).

This guide provides a master procedural roadmap to establish a "basic" cluster of shared RAID storage, focusing on cluster hardware and software configuration tasks. It begins with a new, boxed RAID subsystem and two HP host servers. Procedures for expanding a cluster are also discussed.

Audience

This guide is intended for experienced administrators and system integrators of HP host server and StorageWorks RA7000 / ESA10000 storage subsystem equipment. Setting up a cluster requires a general understanding of HP server networks, RAID storage concepts, HP MC/ServiceGuard cluster software and SCSI hardware configurations. Or, contact your service representative for installation assistance.

Document Structure

This guide contains the following chapters:

Getting Started

This section provides a roadmap to serve as the master procedural guide for establishing a cluster.

Chapter 1: Pre-Installation Steps

This chapter addresses the preparation needed before installing the hardware components of the RAID subsystem cluster. It provides a guide to your options in planning the cluster layout (e.g., the shared RAID subsystem, host servers and, if applicable, the SCSI hub), through the SCSI bus. This chapter also describes how to prepare the two SCSI host adapter boards for a cluster environment.

Chapter 2: Cabling the RAID Subsystem Cluster Components

This chapter describes the procedures for cabling a RAID subsystem to two HP host servers based on the cluster (SCSI) layout option selected in *Chapter 1* of this guide. (Reference Appendix A if clustering more than two hosts or more than one RAID subsystem). It provides detailed illustrations of the cabling and termination required to support HD68-pin SCSI host adapter compatibility, and the use of a SCSI hub.

Chapter 3: Software Setup Requirements for a Cluster

This chapter summarizes and describes, in sequence, each of the software setups required to establish a cluster environment between multiple HP-UX host servers and a shared RAID storage subsystem. It explains how to access, invoke and interact with the SWCC Failover Transition Module Installation Script, which automatically configures the cluster for the seamless failover of the StorageWorks Command Console RAID Manager agent in the event of a server shutdown.

Appendix A: Cabling and Termination Required to Expand a Cluster

An expanded cluster is one in which more than two host servers are connected to a RAID subsystem on the same SCSI bus, or where a second RAID subsystem is added to the cluster on a separate SCSI bus. Appendix A provides the hardware cabling and termination, and highlights the software configurations required to expand a cluster.

Appendix B: De-Installing the SWCC Failover Transition Module

This appendix describes how to reverse the installation of the StorageWorks Command Console Failover Transition Module (agent) within a cluster.

Associated Documents

In addition to this guide, the following documentation is useful to the reader:

Table 1 Associated StorageWorks and MC/ServiceGuard Documents

DIGITAL StorageWorks Document Title	Order Number
Getting Started - HSZ70 Solutions Software V7.1 for HP-UX	AA-R84KB-TE
Release Notes - RAID Array 7000 / Enterprise Storage Array 10000 for HP-UX	AA-R84LA-TE
RA7000 and ESA10000 Storage Subsystem User's Guide	EK-SMCPP-UG
Configuring Your StorageWorks Subsystem HSZ70 Array Controllers Version 7.0	EK-HSZ70-CG
Servicing Your StorageWorks Subsystem HSZ70 Array Controllers HSOF Version 7.0	EK- HSZ70-SV
16-Bit SCSI Bus Hub (DWXXH)	EK-DWZZH-UG
SWCC Command Console 2.0 User's Guide	AA-R60EA-TE
CLI Reference Manual HSZ70 Array Controllers HSOF Version 7.0	EK-CLI70–RM

HP MC/ServiceGuard Document Title	
HP A2969A HP-HSC Fast/Wide Differential SCSI Adapter Installation and Service guide	A2969-90001
HP-PB Fast/Wide High-Performance SCSI Adapter Installation and Service guide (for host adapter 28696)	28696-90001
HP A4107A SCSI Adapter Installation and Service guide	A4107-90001
Hands-On with High Availability and MC/ServiceGuard Student Workbook (Version A.02)	H6487
Managing MC/ServiceGuard	B3936-90019

To Order HEWLETT PACKARD products

To order Hewlett Packard MC/ServiceGuard cluster software/documentation, contact your local sales representative, or contact the HP Customer Support hotline at:

US Customers: 1-800-633-3600

Hewlett Packard Customer Support can also be reached through electronic mail at:

http://www.hp.com

Conventions

In this guide, references to *StorageWorks RAID Array, controller, HSZ70 or subsystem* pertain to

*   RAID Array 7000 (RA7000) or Enterprise Storage Array (ESA) 10000

The term High Availability is abbreviated as (HA).

This guide uses the following documentation conventions:

Table 2 Style Conventions

Style	Meaning
boldface monospace type	To be input by the user.
italic type	For emphasis, manual titles, utilities, menus, screens, and filenames.
plain monospace type	Screen text.
#	Represents the HP system prompt. Do not type it as part of information to be input by the user.

StorageWorks Support and Services

Who to contact in the Americas

Information and Product Questions:	Local Sales Office / StorageWorks Hotline 1-800-786-7967
Installation Support:	Contact the DIGITAL Distributor where the Storage Solution was Purchased / Local DIGITAL Sales Office.
DIGITAL Multivendor Customer Service (MCS)	
Installation	Contact the DIGITAL Customer Support Center (CSC).
Warranty	Contact the DIGITAL Customer Support Center (CSC) for warranty service after s olution is installed and operating.
Remedial	Contact the DIGITAL Customer Support Center (CSC).
	Note: A Service Contract is recommended when the equipment is out of warranty. Contact the local DIGITAL Sales Office.
Customer Support Center (CSC)	1- 800-354-9000

Who to contact in Europe

Information and Product Questions, **Installation Support, and Installation:**	Contact the DIGITAL Distributor or reseller from whom the Storage Solution was purchased.
For Warranty Service	See the Warranty Card packaged with the product.
For Remedial Service	Contact the DIGITAL Distributor or reseller from whom the Storage Solution was purchased.
	Note: A Service Contract is recommended when the equipment is out of warranty.

Who to contact in Asia Pacific

For all services, contact the DIGITAL Distributor or reseller from whom the equipment was purchased.

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http://www.storage.digital.com

Getting Started

This section contains a roadmap to serve as your master guide for establishing a high availability cluster between two or more HP-UX host servers and a shared RAID subsystem. This roadmap presides over all other documentation supplied with your equipment, and refers to those resources as more technical depth is required.

RA7000 / ESA10000 (HA) Cluster Solution for HP-UX

- - - - - - - - - - - - RoadMap - - - - - - - - - - -

STEP	PERFORM THIS PROCEDURE…	DESCRIBED IN…
❑ 1	**All Pre-Installation steps,** Including… ◊ Verify Cluster Requirements ◊ Verify SCSI Connection Kit Contents ◊ Perform a System Backup ◊ Plan the Cluster (SCSI bus) Layout ◊ Prepare the SCSI Host Adapters	*RA7000 / ESA10000 Cluster Solutions for HP-UX* - Chapter 1
❑ 2	**Unpack and Setup the RAID Subsystem**	*Getting Started HSZ70 Solutions Software V7.1 for HP-UX* – Chapter 1 or 2
❑ 3	**Cable and Terminate the Cluster Components**	*RA7000 / ESA10000 Cluster Solutions for HP-UX* – Chapter 2
❑ 4	**Install the StorageWorks Command Console (CC) RAID Manager Software**	*Getting Started HSZ70 Solutions Software V7.1 for HP-UX* – Chapter 4
❑ 5	**Create the RAID Storage Configuration**	*Getting Started HSZ70 Solutions Software V7.1 for HP-UX* – Chapter 6 or 7 *and* Appendix B
❑ 6	**Install/Configure HP MC/ServiceGuard on all Clustered Host Servers**	*(HP) Managing MC/ServiceGuard* manual
❑ 7	**Run the SWCC Failover Transition Module Installation Script**	*RA7000 / ESA10000 Cluster Solutions for HP-UX* – Chapter 3
❑ 8	**Test, Monitor and Manage the Cluster**	*(HP) Managing MC/ServiceGuard* manual

1

Pre-Installation Steps

This chapter addresses the preparation needed before installing and configuring the RA7000 / ESA10000 cluster hardware components.

The pre-installation steps required to support a cluster are as follows:

- Verify Cluster Requirements
- Inventory the SCSI Connection Kit
- Perform a System Backup
- Plan the Cluster Layout (e.g., the SCSI Bus Interconnect)
- Prepare the SCSI Host Adapters

1.1 Verify (RAID RA7000/ESA10000 for HP-UX) Cluster Requirements

Please verify that the cluster requirements listed in Table 1-1 are met.

Table 1–1 RAID RA7000 / ESA10000 for HP-UX – Cluster Prerequisites

Host Feature	Requirement
Platform	Two (minimum) HP host servers
Operating System	HP-UX version 10.20 or later
Cluster Software	HP MC/ServiceGuard version 10.10 or later
Free Disk Space	500KB per server for MC/ServiceGuard software
Storage Subsystem	StorageWorks RA7000 or ESA10000 RAID subsystem
RAID Controllers	Two StorageWorks HSZ70 controllers per RAID subsystem, trilinked, operating firmware V7.0
SCSI Host Adapters	HP, HD68-pin (one adapter per host server). Supported models: A28696A, A2969A, A4107A.
Additional Items	**Requirement**
RAID SCSI Connection Kit	(Reference Table 1-2 for contents)
RAID Hardware	RAID subsystem kit DS-SWXRA-*xx*
Service Tools	Appropriate tools to service your equipment
Technical Documentation	The reference guides for the RAID subsystem, HP servers and MC/ServiceGuard cluster software supplement this installation guide.

NOTES

1.   All of the host features that are supported by the platform kit are also supported in the RAID/HP cluster environment

2.   The installation of a hub requires a 3.5" SSB slot available in your StorageWorks pedestal or shelf.

1.2   Inventory the RAID SCSI Connection Kit

Three types of RAID SCSI Connection Kits exist. Each kit supports the connection of two host servers to a RAID subsystem via a single SCSI bus. To connect more than two host servers in a cluster, or to add a second RAID subsystem, additional parts must be ordered (Reference Appendix A for parts required to expand a cluster). The part numbers and purpose served by each kit is as follows:

*   **SWXKT-DE** – for connecting the RAID subsystem to servers having
        HD68-pin host adapters

*   **SWXKT-DF*** – for connecting the RAID subsystem to servers having
        VHDCI (UltraSCSI) host adapters

*   **SWXKT-EA** – for connecting the RAID subsystem through a hub to servers
         having *HD68-pin or VHDCI host adapters* (both
         adapters must be the same type)

*This kit is not applicable to a RAID RA7000 / ESA10000 Cluster for HP-UX

Please verify that the connection kit you have received is specific to your cluster needs, and use Table 1-2 to inventory its contents. If you are missing any hardware component required for a cluster, please contact your local sales representative or call the StorageWorks Hotline at 1-800-STORWORK (786-7967).

Table 1–2 RAID SCSI Connection Kit Contents (listed by kit number)

RAID SCSI Connection Kit Parts Identification	Kit SWXKT-DE	Kit SWXKT-EA	Kit SWXKT-DF
BN21K-05 — HD68 Straight-Thru Cable	1		
BN37A-05 — VHDCI (UltraSCSI) Straight-Thru Cable		2	1
BN38C-05 — VHDCI-to-HD68 Adapter Cable (5 meter)	1	1	1
BN38E-0B — VHDCI-to-HD68 Adapter Cable		2	1
BN21W-0B — HD68-Pin Y-Cable	2		
BN37C-0C — VHDCI Y-Cable			2
H879-AA — HD68 M Differential Terminator	2		
H8863-AA — VHDCI M Differential Terminator			2
DS-DWZZH-03 — 3-Port Differential Hub		1	
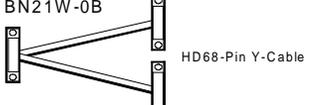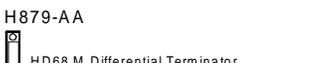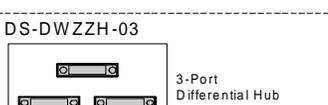
SHR-1026

NOTES

1. Above, VHDCI (UltraSCSI) parts are shaded; HD68-Pin (fast, wide SCSI) are white.

2. To supplement the RAID SCSI Connections Kit, please locate the following parts supplied with your RAID subsystem:
    - One BN37A-05 - VHDCI UltraSCSI (straight-thru) cable (RA7000)
    - One BN38E-0B - VHDCI-to-HD68-Pin Adapter cable (RA7000 / ESA1000)

1.3 Perform a System Backup

Follow normal procedures to backup the RAID subsystem and the host servers in your cluster, as applicable, prior to installing any of the cluster components.

1.4 Plan the Basic Cluster Layout (SCSI Bus Interconnect)

To plan the layout of cluster components through the SCSI bus, first define the two ends of the SCSI bus by selecting *where you want to locate the RAID* subsystem on the bus relative to the other components (the two HP hosts and, if applicable, the SCSI Hub). Determining the RAID location depends on your preference or any physical limitations of your facility (see *"Note"* below). You can locate the RAID subsystem:

- In the middle of the SCSI bus - (Mid-Bus RAID)

- Radiating from a Hub - (Hub-Radiant RAID)

- On an end of the SCSI bus - (End-Bus RAID)

> **NOTE**
>
> The maximum bus length for a mid-bus or an end-bus RAID layout is 25M (*include* the Y-cable length when calculating total bus length).
>
> For a hub-radiant RAID layout, the maximum distance of each radial arm (from the hub to a device) is 25M.

Table 1–3 RAID Subsystem Basic Cluster (SCSI Bus) Layout Options

For This Cluster Layout Option ▼	And This Type of Host Adapter	Reference This Section & Figure	
Mid-Bus RAID	HD68-Pin	2.2	2–1

Host A   RA7000 / ESA10000 Subsystem   Host B
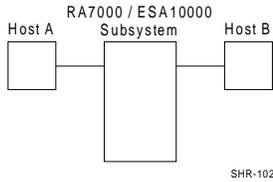
SHR-1021   Mid-Bus RAID

For This Cluster Layout Option… ▼	And This Type of Host Adapter…	Reference This… Section & Figure	
Hub-Radiant RAID	HD68-Pin	2.3	2–2

Host A   Host B

HUB
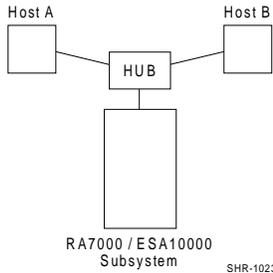
RA7000 / ESA10000 Subsystem   SHR-1023   Hub-Radiant RAID

For This Cluster Layout Option … ▼	And This Type of Host Adapter…	Reference This… Section & Figure	
End-Bus RAID	HD68-Pin	2.4	2–3

Host A   Host B   RA7000 / ESA10000 Subsystem
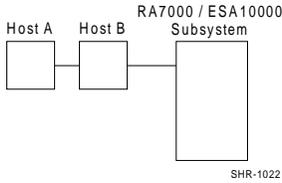
SHR-1022   End-Bus RAID

Use Table 1-3 to select the basic cluster layout that best suits your environment. Prepare and install the SCSI host adapters into your servers (as described in Section 1.5, "Prepare the SCSI Host Adapters"). Then, reference Chapter 2, – *Cabling the RAID Subsystem Cluster Components,* to proceed with the basic cluster installation.

1.5   Prepare the SCSI Host Adapters

Each of the host servers in the RAID subsystem cluster requires at least one supported SCSI host adapter be installed. (Expanding a cluster with a second RAID subsystem requires two SCSI host adapters per server). Prior to installing the SCSI host adapter(s) into each server, as described in your HP Host Adapter installation and service guide, you must prepare each one for a cluster environment. This involves two main steps:

- Setting a unique SCSI host adapter ID

- (For Mid-Bus RAID and End-Bus RAID cluster layouts only) Removing the resistor packs (terminators) on-board the SCSI host adapter

The procedures for setting unique SCSI host adapter IDs and removing resistor packs from the SCSI host adapters are contained in the following sections. As you perform these steps, reference the figure that corresponds to your SCSI host adapter model, as follows:

SCSI Host Adapter	Illustrated In
A28696A	Figure 1-1
A2969A	Figure 1-2
A4107A	Figure 1-3

1.5.1 Set Unique SCSI Host Adapter IDs

It is mandatory that each server in a cluster have a unique SCSI host adapter ID (target ID). The default setting of a SCSI host adapter ID is 7. One of the hosts in the cluster can maintain this ID. Typically, the SCSI IDs for each added server should decrease one number from 7, (6, 5, 4, etc.), to ensure that an unused device number is selected for the server ID.

Use the dip switch on-board the SCSI host adapter(s) to manually set the SCSI host adapter ID on each host server in the cluster to an unused number. (Two host adapters in the same server can have the same SCSI ID, as long as the adapters are not on the same SCSI bus). Reference the Figure for your SCSI host adapter model to locate the SCSI ID dip switch pack.

1.5.2 SCSI Host Adapter Resistor Pack Removal

To remove the resistor packs (terminators) on-board the SCSI host adapters in a Mid-Bus RAID or End-Bus RAID cluster layout, reference the figure for your host adapter board model and proceed as follows:

NOTE

Do not remove SCSI host adapter resistor packs in hub-radiant RAID cluster layouts.

1. Follow normal procedures to shutdown all host servers in the cluster.

2. If applicable, consult the system manual to remove the cover of the server cases and remove the SCSI host adapter board(s) from all host servers in the cluster.

3. Locate the resistor packs on the SCSI host adapter board(s)

4. Gently remove the resistors from the SCSI host adapter boards

5. Install the SCSI host adapter board(s) into the servers according to the SCSI host adapter installation manual supplied with your SCSI host adapter model.

NOTE

Do not reboot the host servers at this time.

The SCSI host adapters are now prepared for a cluster environment. Proceed to Chapter 2, *Cabling the RAID Subsystem Cluster Components*.

Figure 1–1 SCSI Host Adapter Model A28696A

Faceplate

Termination Resistor
Packs R13, R14, R15

SCSI Adapter ID
Switch Pack "S1"
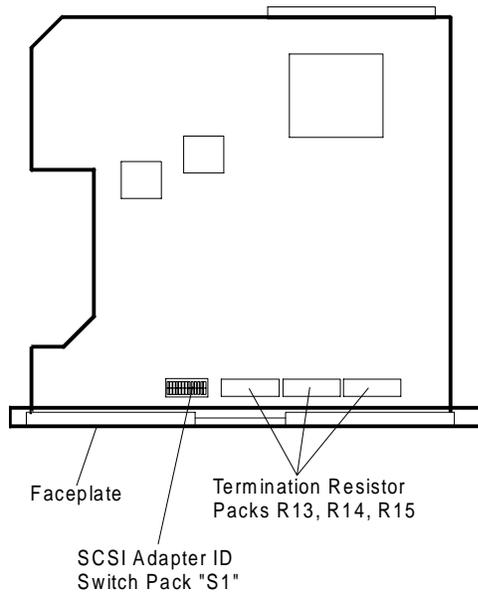
SHR-1122

Figure 1–2 SCSI Host Adapter Model A2969A

Terminator
Resistor Packs
R23, R24, R25

Faceplate

SCSI Adapter
ID Switch Pack "SW1"
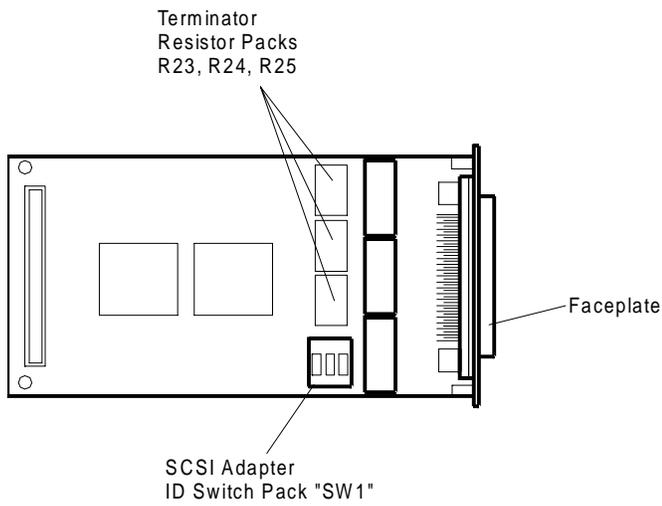
SHR-1121

Figure 1–3 SCSI Host Adapter Model A4107A

Termination Resistor
Packs UC1, UC2, UC3

SCSI Adapter ID
Switch Packs "S1"

Faceplate
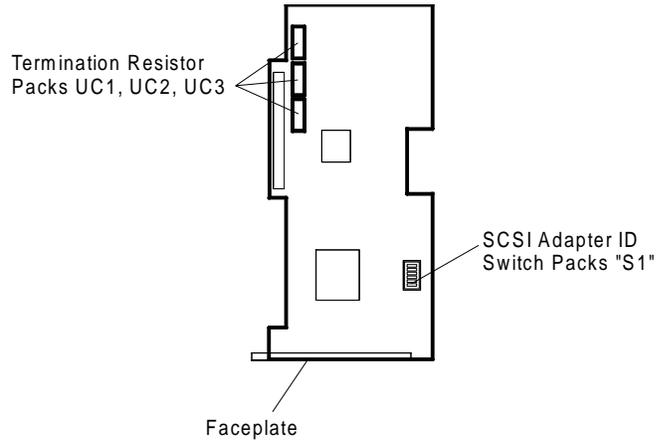
SHR-1123

2

Cabling the RAID Subsystem Cluster Components

This chapter provides the procedures for interconnecting two HP host servers and a shared StorageWorks RAID subsystem through the SCSI bus, and externally terminating the bus as applicable. Interconnection procedures for locating the RAID subsystem in a Mid-Bus, Hub-Radiant and End-Bus layout are provided, based upon the basic cluster layout selected in Chapter 1.

2.1 Connecting RAID Subsystem Components through the SCSI Bus

Based on the basic RAID cluster (SCSI bus) layout option you have selected, locate the procedures in this section (cross-referenced in Chapter 1, *Table 1-1* of this guide), to cable and terminate the cluster components through the SCSI bus. When you have finished, reboot all the servers in the cluster.

NOTES

- The following procedures assume that the SCSI host adapters have been prepared (e.g., on-board resistor packs removed and SCSI IDs set) as described in Chapter 1.

- For clarity in Figures 2-1 through 2-3, the *VHDCI* SCSI cables and terminators are shaded and the HD68-pin (fast, wide SCSI) components are white.

- Cables and terminators supplied with your RAID subsystem supplement the components in your *RAID SCSI Connection Kit*. (See Chapter 1, *Table 1-2*).

2.2 Mid-Bus RAID Cluster Layout - (SCSI Bus Interconnect)

To connect two HP hosts on the two ends of the SCSI bus (e.g., a Mid-Bus RAID cluster layout), with a RAID subsystem, reference Figure 2-1 and follow these steps:

1. Attach a Y-cable (BN21W-0B) to the HD68-pin host adapter on Host A.

2. Attach a Y-cable (BN21W-0B) to the HD68-pin host adapter on Host B.

3. Attach (compatible) end of a 5M adapter cable (BN38C-05) to one end of the Y-cable attached to Host A.

4. Connect the other end (VHDCI compatible) of the adapter cable to the end of a tri-link connector on a subsystem controller.

5. Attach (compatible) end of the short adapter cable (BN38E-0B) to one end of the Y-cable attached to Host B.

6. Connect the other end (VHDCI-compatible) of the adapter cable to the end of UltraSCSI cable BN37A-05.

7. Remove the terminator that occupies the tri-link connector on the subsystem controller.

8. Attach the remaining end of the VHDCI UltraSCSI cable attached to Host A to the available tri-link connector on the subsystem controller.

9. Connect a terminator (H879-AA) to the available end of the Y-cable on Host A, and to the available end of the Y-cable on Host B.

Figure 2–1 Mid-Bus RAID Cluster Layout - (SCSI Bus Interconnect)
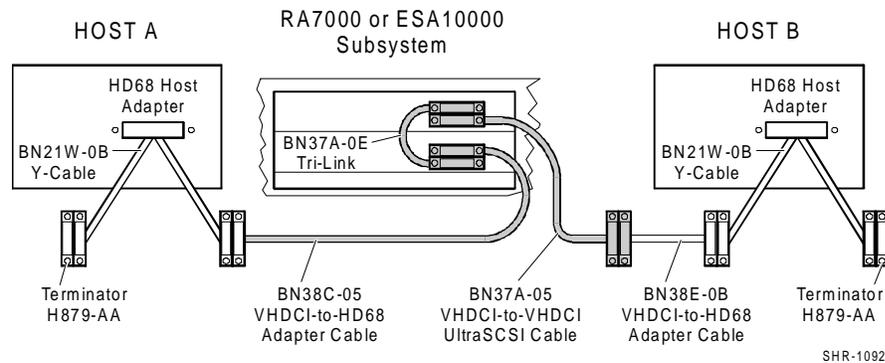
2.3 HUB-Radiant RAID Cluster Layout - (SCSI Interconnect)

To connect two HP host servers to a RAID subsystem via use of a Hub (e.g., a Hub-Radiant RAID cluster layout), reference Figure 2-2 and follow these steps:

1. Attach (compatible) end of the 5M adapter cable (BN38C-05) to the HD68-pin host adapter on Host A.

2. Connect the other end of the adapter cable to a convenient hub port.

3. Attach the compatible end of the short adapter cable (BN38E-0B) to the HD68-pin host adapter on Host B.

4. Connect the other end of the short adapter cable to the end of an UltraSCSI cable (BN37A-05).

5. Attach the remaining end of the UltraSCSI cable to a convenient hub port.

6. Connect one end of an UltraSCSI cable (BN37A-05) to a subsystem controller.

7. Attach the other end of the UltraSCSI cable to the remaining hub port.

8. Connect a terminator (H8863-AA) to the remaining tri-link connector on the subsystem controller.

Figure 2–2 Hub-Radiant RAID Cluster Layout - (SCSI Bus Interconnect)
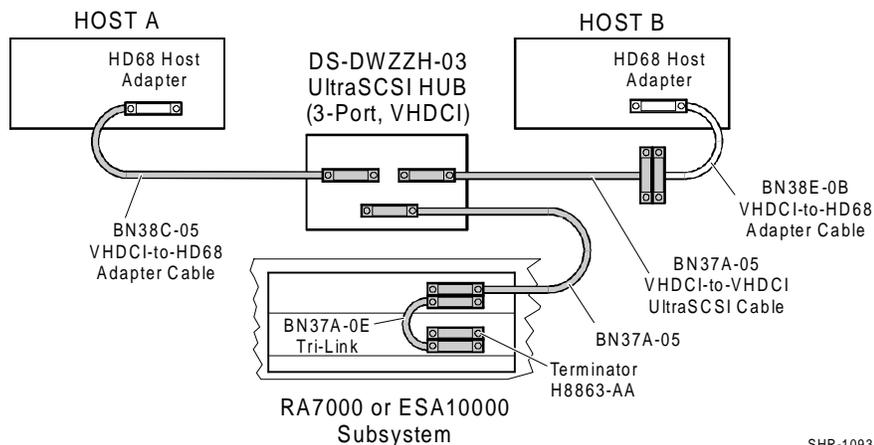
NOTE: In hub configurations, termination is internal to the hub.

2.4 End-Bus RAID Cluster Layout - (SCSI Bus Interconnect)

To connect two HP host servers to a RAID subsystem located on the end of the SCSI bus (e.g., an End-Bus RAID cluster layout), reference Figure 2-3 and follow these steps:

1. Attach a Y-cable (BN21W-0B) to the HD68-pin host adapter on Host A.

2. Attach a Y-cable (BN21W-0B) to the HD68-pin host adapter on Host B.

3. Attach one end of the HD68-pin straight-thru cable (BN21K-05) to a convenient end of the Y-cable attached to Host A.

4. Connect the other end of the cable to a convenient end of the Y-cable attached to Host B.

5. Attach the compatible end of the 5M adapter cable (BN38C-05) to the available end of the HD68-pin Y-cable attached to Host B.

6. Connect the other (VHDCI-compatible) end of the adapter cable to the available end of a tri-link connector on a subsystem controller.

7. Connect terminator H8863-AA to the available end of a tri-link connector on a subsystem controller.

8. Connect terminator H879-AA to the available end of the Y-cable attached to Host A.

Figure 2–3 End-Bus RAID Cluster Layout - (SCSI Bus Interconnect)
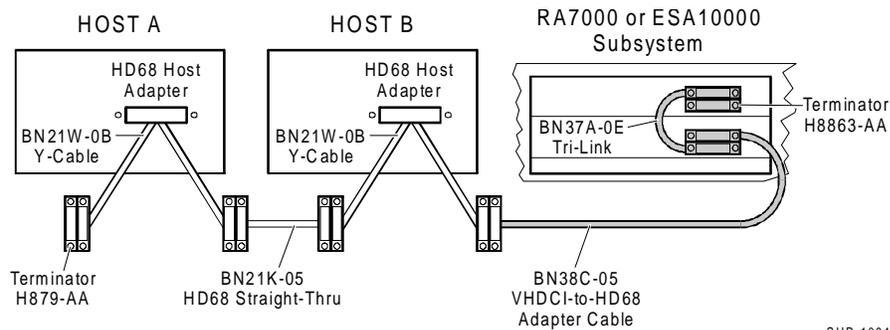
3

Software Setup Requirements for a Cluster

This chapter summarizes and describes in sequence each of the software setups required to establish a high availability cluster environment between multiple HP-UX host servers and a shared RAID storage subsystem.

3.1   Software Requirements Summary

The software setups required to establish a cluster between your RAID subsystem and HP host servers must be performed in the sequence provided in this chapter, which is as follows:

- Install the StorageWorks Command Console (SWCC) RAID Manager software
- Create the RAID storageset configuration
- Install and configure MC/ServiceGuard cluster software on all clustered host servers
- Install/configure the (HP) SCSI pass through device driver software on all remaining host servers comprising the RAID subsystem cluster.
- Run the SWCC Failover Transition Module Installation Script

3.2   Installing the StorageWorks CC RAID Manager Software

The StorageWorks Command Console agent software, which enables management of the RAID subsystem, must be installed and configured on any host server in the cluster from which you choose to perform the initial cluster configuration work. This server is designated as the "primary" host, and all other servers in the cluster, "secondary". This designation must remain constant throughout the procedures described in this chapter.

Reference the *Getting Started – HSZ70 Solutions Software V7.1 for HP-UX*, Chapters 3 and 4, for procedures to install the StorageWorks CC RAID Manager Software on your primary host server. (Chapter 3 is required to prepare your primary host server with the SPT device driver that facilitates communication with the RAID subsystem, and for configuring the HP-UX file system).

3.3   Creating the RAID StorageSet Configuration

Reference the *Getting Started – HSZ70 Solutions Software V7.1 for HP-UX,* Chapters 6 or 7 and Appendices A and B, to plan and create your RAID (storageset) configuration.

3.4   Installing and Configuring HP MC/ServiceGuard Cluster Software

HP MC/ServiceGuard cluster software must be installed and configured on all host servers that share the RAID subsystem.

CAUTION

If a server is connected to a cluster, but is not configured with MC/ServiceGuard software, undesirable conditions could result.

Reference the (HP) *Managing MC/ServiceGuard* manual to install and configure MC/ServiceGuard cluster software on all (primary and secondary) HP host servers that comprise your cluster.

NOTES

When you are using MC/ServiceGuard and assigning the MAX_CONFIGURED_PACKAGES, allow an extra package assignment for the SWCC agent.

For a cluster containing more than two servers, The **\.rhosts** file must contain the "hostname root" or   "IPaddress root" of all servers in the MC/ServiceGuard cluster, not just the two servers connected to the RAID subsystem.

3.5   Running the SWCC Failover Transition Module Installation Script

The SWCC Failover Transition Module Installation Script automates the final software configuration tasks required to establish failover of the StorageWorks Command Console agent, which are:

- Install the (HP) SCSI pass through device drivers on all the remaining clustered servers. (These drivers should already reside on your *primary* host, via the SWCC agent installation process performed in Section 3.2).

> **WARNING**
>
> Installing the SCSI pass through drivers requires a reboot of all servers on which it will be installed.

- Install the SWCC Failover Transition Module (agent) in an MC/ServiceGuard "package" on all clustered servers.

In order for the SWCC RAID Manager agent to failover in the case of a server shutdown, it must be installed in a "package" in the MC/ServiceGuard software that resides on each host server. A copy of the package resides on all hosts. Under normal operating conditions, the RAID Manager will run on the primary host only. When the primary host is unavailable as in a failover, MC/ServiceGuard will start up the RAID Manager on a secondary, assigned takeover host.

To obtain and invoke the SWCC Failover Transition Module Installation Script required for your MC/ServiceGuard cluster configuration, proceed as follows:

1. Download a copy of the tar file (ha_stm_hp01.tar) into your **/tmp** directory, from the following StorageWorks website address:

   http://www.storage.digital.com/menusupport.htm

2. Set your current directory to **/tmp**

3. Extract the script software from the downloaded files by issuing this command:

   # **tar xvf /tmp/ha_stm_hp01.tar**

NOTES

You MUST be root to proceed with the installation process.

The capital letter at the end of each script prompt represents the default response.

---

4.   Run the shell script by issuing this command:

/tmp/ha_install_hp.sh

The SWCC Failover Transition Module Installation Script will prompt you to make several selections regarding your specific cluster configuration options. For the seamless failover of the SWCC transition module agent, be prepared to provide the script with the following information as prompted:

•   name of root directory to place the SWCC software

•   subnet address of the cluster

•   dedicated IP address for the SWCC failover agent

   (this is the IP address used by the SWCC client in order for you to configure and monitor the RAID subsystem within the cluster)

The installation of the SWCC Failover Transition Module in your cluster is now complete. Reference your (HP) *Managing MC/ServiceGuard* manual for procedures to test server failover, and to monitor and manage your cluster.

A

Cabling and Termination Required to Expand a Cluster

This appendix summarizes how to expand a basic (two-server, single RAID subsystem) cluster to support additional servers and/or a second RAID subsystem. This appendix assumes that the pre-installation, hardware and software configuration procedures for a basic cluster have been performed as described in this guide, and focuses only on the procedures required for cluster expansion.

A.1   Hardware Configuration of an Expanded Cluster

A basic cluster, (2 server, single RAID subsystem) configured in an End-Bus RAID or Mid-Bus RAID cluster layout, can be expanded in two ways:

1.   By adding host servers to a single SCSI bus

2.   By adding a second RAID subsystem via a separate SCSI bus

Figure A-1 shows an expanded cluster, where one or more servers have been added the cluster by extending the SCSI bus of the basic cluster, and a second RAID subsystem has been added on a separate SCSI bus. Both RAID subsystems can be accessed by all clustered servers.

The two heartbeats shown in Figure A-1 represent the failover capabilities configurable between clustered servers using MC/ServiceGuard software. In other words, all servers with MC/ServiceGuard software can be configured to failover any other server in the cluster that has MC/ServiceGuard software.

The cabling and termination required to expand a cluster are discussed and illustrated in the following sections.

Figure A–1 Expanded Cluster
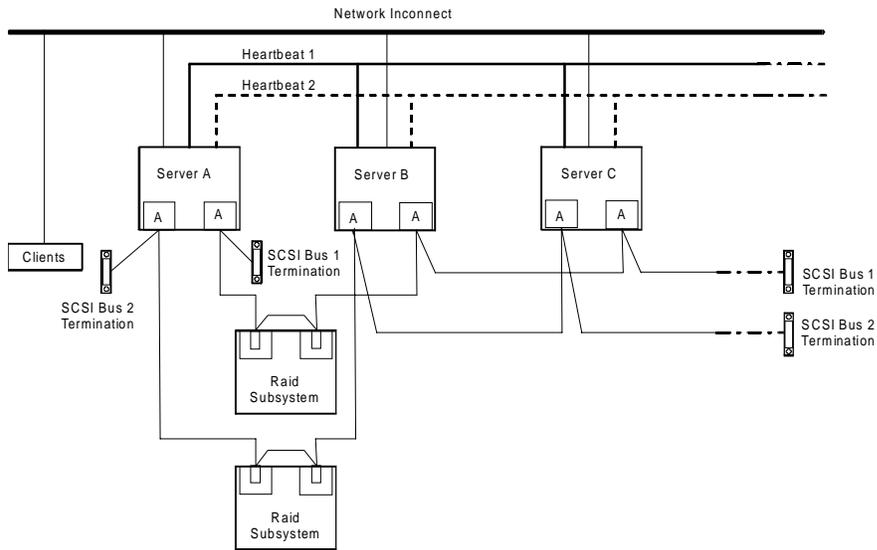
SHR-1131

A.1.1 Adding Host Servers to an Existing Cluster

Each host server added to a cluster requires the following cables:

Part No.	Description
BN21K-xx	HD68-Pin straight-thru
BN21W-0B	HD68-Pin Y-cable

To add a host server to a basic End-Bus or Mid-Bus RAID subsystem cluster, reference Figure A-2 and proceed as follows:

1. Follow normal procedures to backup the all the devices in the existing cluster.

2. Follow normal procedures to power down all the devices in the existing cluster.

3. Attach a Y-cable (BN21W-0B) to the SCSI host adapter of the server being added to the cluster.

4. Connect cable BN21K-05 (HD68-pin straight-thru) to an end of the Y-cable just attached to your new server.

5. Remove the external terminator (H879AA) connected to the end of the Y-cable of the *last* server on the SCSI bus in your existing cluster.

6. Attach the terminator just removed, to the remaining end of the Y-cable connected to your new server.

7. Connect one end of cable BN21K-05 (HD68-Pin straight-thru) to the end of the Y-cable of the server from which the terminator was removed.

8. Connect the other end of cable BN21K-05 to the available end of the Y-cable of your new server.

Figure A–2 Adding Host Servers to an Existing Cluster

NOTES

Repeat these procedures for each new server to be added to the cluster. When finished, follow normal procedures to power-up all cluster devices.

Make sure that each server added to the cluster is configured for a cluster, according to Chapter 3 of this guide.

A.1.2 Adding a Second RAID Subsystem to an Existing Cluster

A second RAID subsystem can be added to an existing cluster by building a second, separate SCSI bus between the existing clustered servers and the new RAID subsystem. This requires a second SCSI host adapter be prepared and installed (reference Chapter 1, *Pre-Installation Steps*), in each of the host servers comprising the cluster. In this scenario, both RAID subsystems can be shared by all clustered servers. Figure A-1 illustrates the cluster layout when a second subsystem (and more than two servers) are added to a *Mid-Bus RAID* subsystem cluster layout.

NOTES

The second RAID subsystem must be configured as defined in the RoadMap of the *Getting Started* section of this guide.

Follow normal procedures to backup the existing cluster devices and then power down the cluster devices prior to connecting the second subsystem.

Reference Chapter 2, *"Cabling the RAID Subsystem Components"* for the parts and procedures required to cable and terminate a SCSI bus, integrating the following differences that apply to the second subsystem:

1. Physically cable the second RAID subsystem to the same two host servers as the first (existing) RAID subsystem.

2. Connect the Y-cables to the second host adapter in each server.

3. Be sure to terminate both ends of the second SCSI bus.

B

De-Installing the StorageWorks Command Console Agent

This appendix describes how to reverse the installation of the StorageWorks CC Agent within a cluster.

B.1 StorageWorks CC Agent De-Installation Procedures

To de-install the CC agent (and the CC agent package) from the cluster, enter the following command:

 # /base_dir/steam/bin/stgwks.sh

Select menu option 4 of the first menu. Then select menu option 5 of the subsequent menu. You will be prompted to exit to remove pass-through drivers, if installed, and then prompted to confirm the directory location. Answer yes to both prompts to remove the CC agent and the MC/ServiceGuard CC agent "package" from the cluster.

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